Thrombosis and Haemostasis 2015 vol.113 N3, pages 473-481

Regulation of monocyte/macrophage polarisation by extracellular RNA

Cabrera-Fuentes H., Lopez M., McCurdy S., Fischer S., Meiler S., Baumer Y., Galuska S., Preissner K., Boisvert W.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© Schattauer 2015. Monocytes/macrophages respond to external stimuli with rapid changes in the expression of numerous inflammation-related genes to undergo polarisation towards the M1 (pro-inflammatory) or M2 (antiinflammatory) phenotype. We have previously shown that, independently of Toll-like receptor activation, extracellular RNA (eRNA) could exert pro-thrombotic and pro-inflammatory properties in the cardiovascular system to provoke cytokine mobilisation. Here, mouse bone marrow-derived-macrophages (BMDM) differentiated with mouse macrophage-colony-stimulating factor (M-CSF) were found to be skewed towards the M1 phenotype when exposed to eRNA. This resulted in up-regulated expression of inflammatory markers such as Tnf-α and Il-6, together with Il-12 and iNOS, whereas anti-inflammatory genes such as chitinase-like proteins (Ym1/2) and macrophage mannose receptor-2 (Cd206) were significantly down-regulated. Human peripheral blood monocytes were treated with eRNA and analysed by micro-array analysis of the whole human genome, revealing an up-regulation of 79 genes by at least four-fold; 27 of which are related to signal transduction and 15 genes associated with inflammatory response. In accordance with the proposed actions of eRNA as a pro-inflammatory “alarm signal”, these data shed light on the role of eRNA in the context of chronic inflammatory diseases such as atherosclerosis.

http://dx.doi.org/10.1160/TH14-06-0507

Keywords

Extracellular RNA, Gene expression, Inflammation, Microarray technology, Monocyte/macrophage polarization